Submillimeter measurements of photolysis products in Interstellar Ice Analogs: A new Experimental technique.

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Abstract:
Over 150 molecular species have been confirmed in space, primarily by their rotational spectra at millimeter/submillimeter wavelengths, which yield an unambiguous identification. Many of the known interstellar organic molecules cannot be explained by gas-phase chemistry. It is now presumed that they are produced by surface reactions of the simple ices and/or grains observed and released into the gas phase by sublimation, sputtering, etc. Additionally, the chemical complexity found in meteorites and samples returned from comets far surpasses that of the remote detections for the interstellar medium (ISM), comets, and planetary atmospheres. Laboratory simulations of interstellar/cometary ices have found, from the analysis of the remnant residue of the warmed laboratory sample, that such molecules are readily formed; however, it has yet to be determined if they are formed during the warm phase or within the ice during processing. Most analysis of the ice during processing reveals molecular changes, though the exact quantities and species formed are highly uncertain with current techniques due to overwhelming features of simple ices. Remote sensing with high resolution spectroscopy is currently the only method to detect trace species in the ISM and the primary method for comets and icy bodies in the Solar System due to limitations of sample return. We have recently designed an experiment to simulate interstellar/cometary/planetary ices and detect trace species employing the same techniques used for remote observations. Preliminary results will be presented.